

Building Construction's Material Cost Estimation

Prof. Mrudula Gudadhe¹, Praful Tabhane², Nikita Dange³

^{1,2,3}(Department of Information Technology, Priyadarshini College of Engineering, Nagpur/RTMNU, India)

Abstract :- Investing requisite amount of money in the construction of the building is the principle parameter which is to be considered before the construction actually commences. Because cost is the fundamental entity on which various factors of the construction confides in. To cutback the human effort is the primary motive of any software. Following this idea, this paper of building construction's material cost estimation deals with facilitating the user with the comfort in calculating the material's cost involved in construction right on his desk. This estimator integrates the cost of each material given the parametric values of every sub-structure of the building which renders accurate cost estimation of the whole building.

Keywords: - building construction, pre rendering, 3D image representation, cost estimation

I. INTRODUCTION

Cost estimation is important for any business but it is particularly critical in construction industry. Exact and timeous fiscal reports can help to monitor the design of the building, control costs, improve profitability and manage cash flow. Revenue recognition is one of the main principles of chiefly accepted accounting principles which strive to match expenses that generate them. However this matching of revenues with expenses can be a challenge over the earnings process spans a long stretch of time. With a lengthy construction project, on the other hand, a contractor performs work over several months or even year. A project's scope, costs, revenues can vary over the contract's term so the actual profit or loss linked with a job will not be known with surety until the project completion.

There are various phases during the construction of the building. All these phases include their share of cost during the development. The judgments made in the design phase hampers the construction cost. The design phase gets most affected if the cost for the construction is not determined appropriately as the rest of the phases by order depend upon it. Therefore the earlier we start the cost planning the more accurate we get the results. The limited availability of the information to the designers refrain them from estimating the accurate cost involved in constructing the design phases.

Factors affecting construction of the building are categorized under five main groups. Project related factors includes attributes of type of project, nature of project, intricacy of project and size of project. Procurement-related factors include attributes such as procurement method and tendering. Project management factors includes attributes of communication system, control operations, feedback potency, planning effort, organization structure, safety and quality guarantee program and finally the overall managerial actions. Human related factors includes the attributes constituting client as the main focus at which various client dependent factors are considered such as client's emphasis on low construction cost, high construction quality, quick construction, client's ability to brief and to make decisions. The external factors includes attributes such as economic environment, social environment, political environment, physical environment, industrial relation environment and level of technology advanced. All these factors are interdependent. An attribute in one factor can affect an attribute in other. These factors can be owned as a base for further detailed scrutiny of on respective construction projects.

Conventional methods of calculating the cost includes the manual calculation or use of basic calculators. These methods have various disadvantages. The guesswork comes into play regarding the estimation concerning the overall cost even after calculation by these methods because it is a forethought that the cost involved in the construction is never foolproof as human is prone to errors and accordingly spring with faults in the calculation which leads to an incorrect estimated cost. Therefore we deal with approximate cost. Also if the construction is intended on a large sale even a trivial fault in the calculation can cause either full calculation from the scratch or examine the full calculation to find the error. In either context the efficient work time will be consumed which may have been otherwise used for some productive work.

If the cost for the development of the construction project is calculated at the very end it is possible that there can arise a fluctuation in the cost owing to unfavorable conditions being inflation or false billing. People can fall prey to the wrong intentions of the contractors regarding incorrect estimation of the materials' cost. The economic factor experiences great loss. So a pre calculated cost will reduce this loss. Construction practitioners are aware of inconstant, inadequacy, unknown circumstances and complex correlation of factors involving cost and duration of construction projects. So the cost should be estimated as such which gives accurate and reliable cost forecast of construction project.

II. PROPOSED METHODOLOGY

Causes of cost escalations in the construction can be profuse and any attempt to ascertain them in order to define regional disparities stand in need that all the main construction cost components affected by the increase must first be recognized.

1. Data Acquisition

Requirement specifications for the software are mustered provided that all the factors that could influence the cost estimation. Brief the data to the paramount level so as to ensure every group of factors is ruminated. The materials for the construction is elementary requirement. Here we need not to order the materials but we are referring to the just draw the list of the materials along with their respective prices for one unit of each material. Another data required will be the metrics of the building with the needed enhancements such as the number of windows or doors should be well specified in the start at the designing phase. Note that the requirements specified must be a real time content

2. Input data

The user needs to fill up his personal details to estimate cost for the building. The measurement values of the building is entered for the architectural as well as structural designing of the building. Next we enter the unit prices of each construction material which will be the according to the current prices of the materials in the market.

The screenshot shows a software window titled "Version 0.1" with a light blue background. It is divided into two main sections: "Fill User Details :-" on the left and "Price of Materials :-" on the right. Below these sections are two buttons: "Clear" and "Next".

Field	Value
Full Name	Suresh Patil
Address	Nagpur
Email id	sp100@gmail.com
Mobile No.	9876543210

Material	Price
1 Brick Rs.	3
1 k.g Steel Rs.	15
50 K.g Cement Rs.	250
500 kg Rubble Rs.	1200
500 K.g Sand Rs.	1100

Figure 1 Details of user and unit price of materials

The screenshot shows a software window titled "Version 0.1" with a light pink background. It is divided into three main sections: "Build Foundation" (top left, light blue), "Beam and Column" (bottom left, light red), and a large empty green area (top right). Below the "Beam and Column" section are two buttons: "Next" and "Clear".

Build Foundation

- Second Floor in Future
- First Floor in Future
- Ground Floor

Beam and Column

Height of Column (Per ft)	8 Ft	Length of Beam Side 1 (Per ft)	8
No. of Column	4	Length of Beam Side 2 (Per ft)	10

Figure 2 Input metric values of sub-structure of building

III. Cost Estimation

The software is having an edit option where we can edit the information filled up previously. A quick overlook can be done to ensure that the entered data is up to the mark because wrongly entered data could hamper the calculation so it is a must to fill the correct information to get the appropriate results. When the

user is sure of the correctness of the data the final step of the cost estimation can be proceeded with. The output will be displayed revealing the total amount of materials required for the construction and the total estimation of the cost of the building. The cost solely depends on the data entered so appropriate data will result in appropriate results.

		Price of Material
Total Cement (KG)	96	365
Total Rubbel (KG)	192	555
Total Steel (KG)	96	1440
Total Sand (KG)	96	100
Total Bricks Required	2020	6060

Buttons: Calculate Material, Back, Total Cost: 8520

Figure 3 Model output

1. 3D Image Representation

Visualization gives off better perception of the information. Accordingly this software is having an additional feature provided to the user to get a view of the components of the building as to how it will be appeared after the entry of the measurement values. The size and shape of the structure will be modified in real time as required

2. Pre Rendering

The concept of pre rendering is used to display the images. This is the technique in which the hardware does not perform the rendering in the real time. Alternatively the images will be rendered antecedently on the systems which are more preminent comparatively with that of the hardware which is used for the displaying of the images.

The pre-rendering defines anything which need not to be rendered in real time Pre rendering facilitates the programmer to use the processing time to invest in other important sectors of the software. The calculation of the estimation of the cost is being performed by the software in real time. This process itself requires ample amount of processing. Here in this case pre rendering proves to provide an ease to lower the stress of the processing thereby substantially reducing the time which would have been else spent on rendering the images.

IV. FUTURE SCOPE

This software can be considered as an estimator for the calculation of the cost involved in the construction of the building. Its usability, scalability and reliability can be extended on a wide range.

- this estimator is working on a local level. It can be augmented on a remote level.
- the authentication can be provided to reflect the authenticity of the user.
- the structure of the building can be extended by adding modules in the software.
- this software can be linked with another source on the internet which will be showcasing the current prices of the materials enabling the user to get the estimated cost accurate.
- the collaboration of the software with the commercial sites providing the facility to place order of the materials to be delivered at the doorsteps will expedite the user extensively.
- the feature of rendering the images can also be added to represent images in real time.

V. CONCLUSION

The cost is the uppermost criteria to be considered for the construction of any building structure. With the implementation of this software in the planning of the construction will provide the client, contractors as well as the designers to have a clear notion of the budget of the construction and thus will pave a way to proceed with the further stages of the construction light minded without affecting the fiscal structure as it will be preplanned. The ultimate objective is to build up a cost estimator which outputs the accurate cost the building materials and furthermore the total cost of the construction of the building. This estimator will serve the need of calculating the cost before the implementation of the designing phase; it will thereby help the constructors to have an idea about the overall cost of the construction project.

REFERENCES

- [1] Nabil Ibrahim El Sawalhi, Modelling the Parametric Construction Project Cost Estimate using Fuzzy Logic, *International Journal of Emerging Technology and Advanced Engineering*, volume 2, issue 4, 2012
- [2] Albert p.c. chan, DavidScott, Ada p.l. chan. Factors affecting the success of a construction project. *Journal of Construction Engineering and Management*, Volume 131, Issue Number 6, 2005
- [3] Vishal Verma, Ekta Walia, 3D Rendering - Techniques and Challenges, *International Journal of Engineering and Technology*, Volume 2, issue 2, 2010.
- [4] Chandan Singh, Ekta Walia, "Shading by Fast Bi-Quadratic Normal Vector Interpolation", *ICGST International Journal on Graphics, Vision and Image Processing*, Vol. 5. Issue 9, 2005
- [5] Gunaydin, M., and Dogan, Z., 2004. A neural network approach for early cost estimation of structural systems of buildings. *International Journal of Project Management*, Vol. 22, pp. 595–602.
- [6] M. Lhuillier and L. Quan. "Image interpolation by joint view triangulation." *In IEEE Conference on Computer Vision and Pattern Recognition*, volume 2, pages 139-145, Fort Collins, CO, June 1999.

- [7] A. Laurentini, "The Visual Hull Concept for Silhouette Based Image Understanding." *IEEE PAMI*, Vol. 16, No. 2, pp. 150-162, 1994.
- [8] B. Cabral, M. Olano, P. Nemeč, *Reflection space image based rendering*, Computer Graphics (SIGGRAPH'99), pp.165-171. August 1999.
- [9] Chang C, Ger S. "Enhancing 3D graphics on mobile devices by image-based rendering". *Proceedings of the Third IEEE Pacific Rim Conference on Multimedia: Advances in Multimedia Information Processing, Taiwan*, pp. 1105–1111. 2002.
- [10] Boukerche A, Jing F, de Araujo R B. "A 3D image-based rendering technique for mobile handheld devices". *Proceedings of the 2006 International Symposium on a World of Wireless, Mobile and Multimedia Networks (WoWMoM'06), Buffalo*, pp. 325–331. 2006
- [11] A.Warsame *Supplier structure and housing construction costs* (2006).
- [12] R.K. Bansal, *strength of materials* (Laxmi Publications, 2010).